



## AQUATIC EXERCISE IN PATIENTS WITH CHRONIC LOW BACK PAIN: A CASE STUDY

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### Abstract

**Introduction** : Chronic low back pain is defined as pain in the lower back that lasts more than 12 weeks. The average prevalence of LBP sufferers is 39% in adults. In Lower Cross Syndrome there is tension in the thoraco-lumbar extensor muscles that cross the m. iliopsoas and m. rectus femoris. As well as weakness in the abdominal muscles that cross the m. gluteus maximus and medius. Schober test is used to determine ROM in the lumbar. Aquatic exercise can be used for the purpose of facilitating Range of Motion (ROM) exercises, facilitating weight-bearing exercises, minimizing the risk of injury or re-injury during rehabilitation, and promoting relaxation.

**Case Presentation** : A patient named Mr. AN is 36 years old and works in the TNI. The patient complained of pain in the lower back and limitation of bending motion. Diagnosis of Chronic Low Back Pain (non-specific). Schober test measurements obtained results of 2 cm.

**Management and Outcomes** : The physiotherapy process was carried out on patients in the hospital with 5 meetings. The aquatic exercise movements used include Stretching, Strengthening, Stabilization, Pelvic Tilt. Measurement of lumbar ROM using the Schober test.

**Discussion** : After the patient received 4 sessions of physiotherapy, evaluation of the lumbar ROM measurement was carried out using the Schober test. The results of the measurement of lumbar ROM with the Schober test showed a significant improvement, from 2cm to 3.1cm. Where with these results it can be concluded that there is an additional lumbar ROM.

**Conclusion** : The physiotherapy program which was carried out four times in cases of Chronic Low Back Pain using aquatic exercises which included stretching, strengthening, stabilization, and pelvic tilt was proven to be able to increase the Range of Motion (ROM) in the lumbar.

**Keywords:** Low Back Pain, Schober Test, Aquatic Exercise, Buoyancy



## Introduction

Low Back Pain (LBP) or low back pain is pain and discomfort that is complained between the ribs and the gluteal, pain or pain can also appear up to the feet(1). Low back pain is classified into "specific" and "non-specific". Non-specific low back pain is called LBP without any recognizable specific pathology(2). Usually categorized according to time, there are three groups: acute (less than 6 weeks), subacute (between 6 weeks to 3 months), and chronic (more than 3 months). Chronic Low Back Pain is defined as pain in the lower back that lasts more than 12 weeks(3). The average prevalence of LBP sufferers is 39% in adults(4). The global prevalence of LBP has increased by 17.3% from 2005 to 2015 and has continued to be the leading cause of disability since 1990(5). LBP usually recurs with 24 to 87% of individuals experiencing LBP within one year(6). LBP affects both young and old people, but the situation gets worse at the age of 30-60 years and over.

Lifestyle factors such as smoking, obesity, and low levels of physical activity are usually associated with LBP (7). Trunk muscle weakness, important deficits of the neural control units of the spinal stabilizing system, and decreased lumbar proprioception are also contributing factors for LBP.(4). Postural errors such as head down, shoulders arched forward, abdomen protruding forward and excessive lumbar lordosis can cause muscle spasms (muscle tension), this can lead to Low Back Pain. Muscle imbalance occurs when the length and strength of the agonist and antagonist muscles limit normal function. For example, muscle weakness during hip flexion and limited hip extension due to tension in m. Hamstring(8). Lower Cross Syndrome is a postural muscle disorder with decreased ROM, shortening of the hip muscles and extensor muscles, this causes additional stress on the joints and soft tissues in the spine.(9). In Lower Cross Syndrome there is tension in the thoraco-lumbar extensor muscles that cross the m. iliopsoas and m. rectus femoris. As well as weakness in the abdominal muscles that cross the m. gluteus maximus and medius(10).

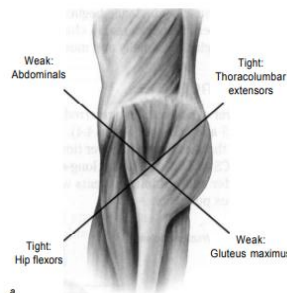


Figure 1. Lower Cross Syndrome (11)



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The Schober test is used to determine the ROM of the lumbar itself. If the result of the difference in distance in adults from this test is less than 4 cm, it indicates a disturbance in lumbar ROM. Aquatic exercise is an exercise that is done in water, usually done in a tub or pool. Movements performed in water can reduce pain compared to similar movements performed on land(12). Characteristics of the aquatic environment affect physiological processes, motor activity, and spasticity because it can provide a supportive and motivating environment for the patient(13). Buoyancy can help offset gravity, which is why it is very useful for therapy(14). Aquatic exercise can be used for the purpose of facilitating Range of Motion (ROM) exercise, facilitating weight-bearing exercises, minimizing the risk of injury or re-injury during rehabilitation, increasing relaxation(15).

### Case Presentation

This study includes a case study, in a patient named Mr. AN is 36 years old and works in the TNI. The patient complained of pain in the lower back and limitation of bending motion. Complaints appeared approximately 4 months after the patient did the yongmoodo martial arts sport, where the patient was diagnosed with Chronic Low Back Pain (non-specific). Complaints get worse, especially when used for long sitting, long standing, and lifting heavy weights. However, complaints can be reduced when resting and using a balm or patch. Although there are complaints, the patient is still able to carry out his work as a TNI and carry out activities as usual and can ride his own motorbike when going to therapy. After suffering from LBP, the patient routinely checks with the doctor and performs routine therapy, where the patient's complaints are getting better. It is known that the patient went to physiotherapy starting in the last 3 months on a regular schedule. The therapist checks vital signs which can be seen in table 1, as well as the Schober test measurement which results in 2 cm. If seen from the results, it can be categorized that the patient has limited lumbar ROM. The patient's posture is slightly bent due to pain, a slight dragging gait pattern, and difficulty in lumbar flexion.

Table 1. Vital Sign Examination

Vital Signs	Results
Blood pressure	130/80 mmHg (normal)
Pulse	84 x/minute (normal)
Respiration	20 x/minute (normal)





## Management and Outcome

Measurement of lumbar ROM using the Schober test, by preparing a meterline, markers/pens, dry towels/tissues. The initial position of the patient is standing upright with feet shoulder with apart, then mark on SIPS and 10cm above SIPS. Then the patient is asked to bend down until there is a limitation, measuring the distance between the two upper and lower marks. Then calculate the difference between the final and initial measurements in cm. The following is the measurement data for the patient's Schober test, Mr. AN listed in table 2 at the time before and after the intervention. Measurement by calculating the difference in marks before and after the bending movement at SIPS and 10cm above SIPS.

Table 2. Patient data Mr. AN using Schober Test

Name	Gender	Age	Profession	Pretest	Posttest 1	Posttest 2	Posttest 3	Posttest 4
Mr. AN	Man	36	TNI	2cm	2.3cm	2.4cm	3.2cm	3.1cm

The physiotherapy process was carried out on patients in the hospital with 5 meetings (1 time pretest and 4 times post intervention). The purpose of the intervention is to increase lumbar ROM by reducing pain. The aquatic exercise movements used include Stretching, Strengthening, Stabilization, Pelvic Tilt. The following is the dose of exercise according to Pires et.al. year 2014 :

1. Frequency : 2 times a week for 4 weeks
2. Intensity : 2-3 repetitions with 60 seconds rest on each movement
3. Time : 30-60 minutes
4. Type : stretching, strengthening, stabilization

The movements or exercises performed are Spine Stretching Techniques (cervical spine flexion, cervical spine lateral flexion, thoracic and lumbar spine lateral flexion / side bending), Hip Stretching Techniques (hip extension, hip external rotation, hip internal rotation), Knee Stretching Techniques ( hamstring stretch), Dynamic Trunk Stabilization (dynamic trunk stabilization frontal plane, dynamic trunk stabilization multidirectional), Extremity Strengthening Exercise (shoulder internal and external rotation, elbow flexion and extension, hip flexion and extension, functional squatting, ankle plantar flexion), Pelvic Tilt .

## Discussion

After the patient received 4 sessions of physiotherapy, evaluation of the lumbar ROM measurement was carried out using the Schober test. With a pretest result of 2 cm, then after



the results of the first treatment were 2.3 cm and increased at the next meeting with the results of 2.4 cm and 3.2 cm after the third treatment. However, in the fourth treatment, the result was 3.1 cm. In conclusion, the results of the measurement of lumbar ROM with the Schober test experienced a significant improvement, from a difference of 2 cm to 3.1 cm. Where with these results there is the addition of lumbar ROM. Stretching has the main effect of increasing ROM, muscle flexibility, and tissue in the spine(16). Another goal of stretching is to reduce resistance to stretching, allowing freer movement and improved performance(17).

Movement Spine Stretching Techniques (Cervical Spine : Flexion, Cervical Spine : Lateral Flexion, Thoracic and Lumbar Spine : Lateral Flexion/Side Bending), Hip Stretching Techniques (Hip Extension, Hip External Rotation, Hip Internal Rotation), Knee Stretching Techniques (Hamstring Stretch) . Strengthening exercises are used to strengthen the muscles in the abdominal, lumbar, and pelvic areas so that they will contract and adjust the lumbar posture(18). The movement is Extremity Strengthening Exercise. Lumbar stabilization is intended to improve neuromuscular control, strength, and endurance of the muscles that are important for maintaining dynamic spinal and trunk stability.(19). The stabilization movements performed are Dynamic Trunk Stabilization (Dynamic Trunk Stabilization: Frontal Plane, Dynamic Trunk Stabilization: Multidirectional) and Pelvic tilt.

## Conclusion

The physiotherapy program which was carried out four times in cases of Chronic Low Back Pain using aquatic exercises which included stretching, strengthening, stabilization, and pelvic tilt was proven to be able to increase the Range of Motion (ROM) in the lumbar.

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